

# The Impact of Severe Acute Respiratory Syndrome on Otorhinolaryngological Services at The Prince of Wales Hospital in Hong Kong

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**Objectives/Hypothesis:** The objective was to describe the impact of severe acute respiratory syndrome (SARS) on the services of the division of otorhinolaryngology—head and neck surgery at an academic tertiary referral hospital in Hong Kong. **Study Design:** Descriptive. **Methods:** Records of general and subspecialty outpatient attendance, ward admissions, ward bed occupancy, and elective and emergency surgery were obtained for the period since the SARS outbreak and for an equivalent period before the outbreak. The changes in these parameters were determined against the background of new SARS cases. **Results:** Since the outbreak of SARS in March 2003, the weekly outpatient clinic attendance has declined by 59%, the number of operations performed by 79%, the average ward bed occupancy rate by 79% and the daily admission rate by 84%. A dramatic increase of 300% in the number of patients defaulting on their outpatient appointments was recorded. **Conclusion:** The substantial decrease in otorhinolaryngological services at an academic tertiary referral hospital in Hong Kong has been multifaceted. The decrease in attendance at the outpatient clinics reflects the increased number of patients defaulting on their appointments. Nonessential elective surgery was suspended soon after the outbreak, accounting for the decrease in the number of surgical procedures performed and partially for the decrease in ward bed occupancy and ward admissions. The temporary closure of the accident and emergency department contributed to the decrease in ward admissions and emergency surgical procedures. The reduced service offered by the hospital is having an

impact on the quality of care available to patients with non-life-threatening otorhinolaryngological conditions. **Key Words:** Severe acute respiratory syndrome virus, disease outbreaks, otolaryngology, health services.

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## INTRODUCTION

An outbreak of atypical pneumonia, referred to as severe acute respiratory syndrome (SARS), occurred in Hong Kong in March 2003.<sup>1</sup> Severe acute respiratory syndrome is a highly contagious and infectious disease that leads to significant morbidity and mortality.<sup>1–8</sup>

Wide-ranging infection-control measures were instituted at the Prince of Wales Hospital in Hong Kong to control the spread of the disease among health care workers, patients, and members of the public. These included the suspension of nonurgent elective surgery, closure of some wards, temporary closure of the accident and emergency department, redeployment of staff to care for patients with SARS, and the suspension of clinical teaching. However, the otorhinolaryngological outpatient clinic, which was considered to be a low-risk environment to staff and patients, has remained open from the onset of the outbreak and has continued to a normal service.

The impact of the outbreak of SARS on otorhinolaryngological services at the Prince of Wales Hospital has been substantial; service delivery, staffing, management protocols, training, and education have all been affected. To quantify this impact on the otorhinolaryngological service, we undertook a study to measure the magnitude of the changes following the SARS outbreak. This has enabled us to best use available resources under the present conditions, to redeploy staff where and when necessary, and to make contingency plans should the outbreak persist or recur.

## MATERIALS AND METHODS

Records of general and subspecialty outpatient attendance, ward admissions, ward bed occupancy, elective surgery per-

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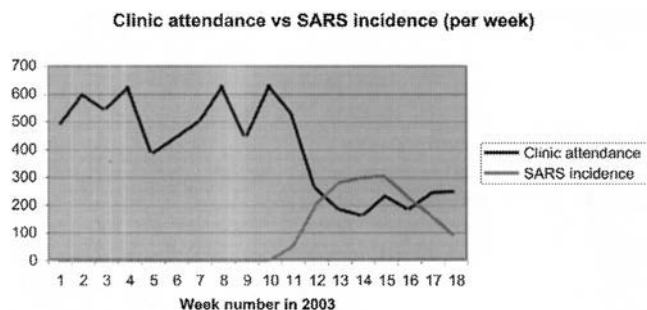


Fig. 1. Clinic attendance versus incidence of severe acute respiratory syndrome (SARS) by week.

formed under local and general anesthesia, and emergency surgery were obtained from the relevant administration offices. The outbreak became apparent over the weekend of March 8 and 9, 2003. Records were obtained for the period from the onset of the SARS outbreak to the time of writing (approximately 9 weeks) and for an equivalent 9-week period before the outbreak. The daily data for new SARS cases in Hong Kong were obtained from the Hong Kong Hospital Authority Information Officer. Weekly average values and the percentage of decrease in the parameters studied were determined and used to quantify the impact of the SARS outbreak on the normal status of otorhinolaryngological services at the hospital.

## RESULTS

A computerized booking and attendance system exists for the outpatient clinic and for ward admissions and discharges. All records from the clinics and wards were retrieved. A surgical logbook (into which theater staff enter details of all surgical procedures carried out) was accessed, and all surgical data were retrieved.

Since the outbreak of SARS, the average weekly patient attendance at the outpatient clinics has decreased by 59% (Fig. 1), the average ward bed occupancy has decreased by 79%, the admission rate has decreased by 84% (Fig. 2), and the number of operations performed has decreased by 79% (Fig. 3). There has been a dramatic increase of 300% in the number of patients defaulting on their outpatient appointments (Fig. 4).

There has been a multicountry outbreak of an atypical pneumonia referred to as SARS.<sup>1</sup> In Hong Kong, it has affected all aspects of the community and the economy. Schools and universities have been closed, social events

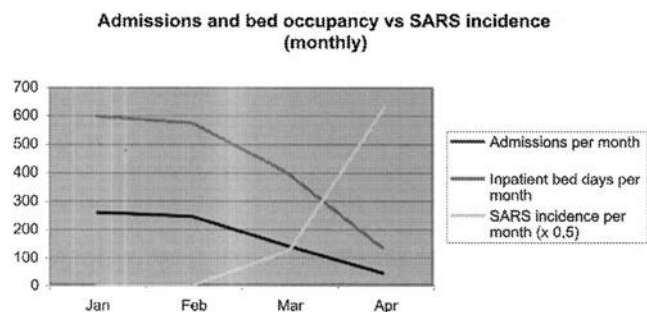


Fig. 2. Admissions and bed occupancy versus incidence of severe acute respiratory syndrome (SARS) by month.

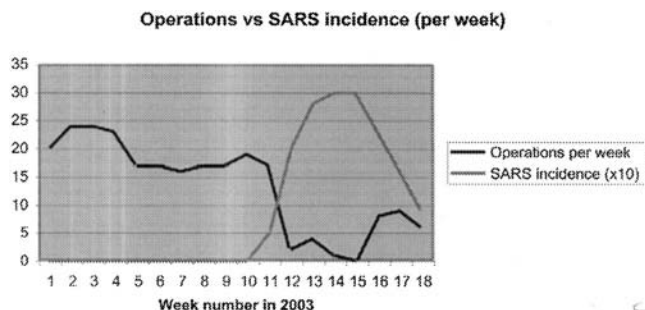


Fig. 3. Operations versus incidence of severe acute respiratory syndrome (SARS) by week.

have been cancelled, economic forecasts have been downgraded, and the tourist industry has all but collapsed.

The Hong Kong index case of SARS arrived from southern China on February 21, 2003.<sup>2</sup> The Prince of Wales Hospital index case was admitted with pneumonia on March 4, 2003.<sup>8</sup> The first indication that an unusual viral illness was present in a large number of health care workers at the Prince of Wales Hospital became evident on March 8, 2003, when a number of staff working in the same ward developed symptoms of an upper respiratory tract infection including fever, runny nose, sore throat, and cough, and other individuals developed chills, rigors, myalgia, and dizziness. The number of staff from that ward developing these symptoms rapidly increased on March 9 and 10, 2003, until approximately 50 health care workers who had been to or had worked in that ward developed symptoms. It became obvious that an unidentified infectious process was present. Based on this fact, appropriate wide-ranging infection control measures were instituted at the hospital on March 11, 2003.

Patients admitted for elective investigations and procedures, those fit enough to be cared for at home or at other institutions, and those who could be treated as outpatients were discharged. Patients remaining in the hospital were consolidated to allow for the closure of empty wards. This enabled staff to be redeployed to locations where the need was the greatest, usually to the medical wards to care for patients with SARS.

The accident and emergency department of the hospital was closed temporarily for 3 weeks. This department was closed because the hospital had reached the limit of

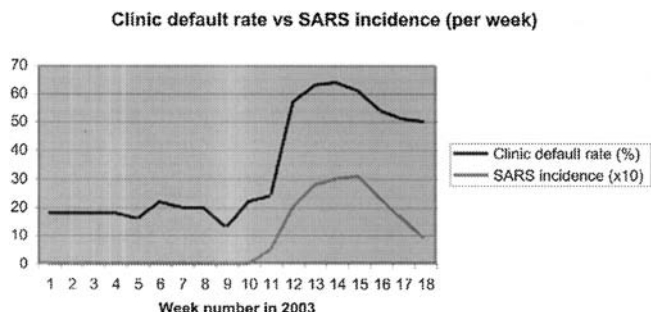


Fig. 4. Clinic default rate versus incidence of severe acute respiratory syndrome (SARS) by week.

its capacity to admit new SARS cases, a limit determined by the availability of beds in the intensive care unit (ICU), which at that stage was at full capacity. This also had the consequence that the hospital was not able to admit any patient who may have needed ICU admission or perform any procedure that may have led to a need for postoperative admission to the ICU. Therefore, new SARS cases and all emergencies were diverted to and were seen at neighboring regional hospitals.

After a period of 3 weeks the accident and emergency department resumed its service. Effective protocols, screening procedures, and a 24-hour holding admission ward had been established, but an anticipated exponential rise in daily new cases had not occurred, so the ICU once again had capacity to admit new SARS cases needing specialized care.

All nonessential elective surgery has been suspended. Surgery is limited to patients in whom malignancy is suspected or confirmed and to emergencies, such as the removal of foreign bodies and the management of sepsis. A further proviso to a patient undergoing surgery is that the patient will not need to be admitted to a high-level care unit or ICU following surgery because these facilities have presently been allocated for the exclusive care of patients with SARS. Even with these restrictions, the head and neck oncology unit has been able to offer a near-normal service and has performed three resections of oral cavity tumors and a resection of a cervical sarcoma (all with free flap reconstructions), three nasopharyngectomies, and a laryngectomy.

All clinical teaching was suspended. All medical students were instructed to stay away from the hospital to decrease their risk of being exposed to and contracting SARS. All patient contact by medical students was suspended on March 12, 2003. No medical student is allowed into the hospital. All student teaching has continued in facilities away from the hospital where no patient contact can occur. Lecturers and students wear masks, lectures are shorter and to the point, and the ventilation in lecture rooms has been increased. Increased use is being made of Web-based teaching. Lectures are posted on the Internet, and electronic communication with teaching staff is possible. All nonessential academic meetings were suspended to limit the gathering of health care workers in a confined space for an extended period.

The otorhinolaryngology outpatient clinic, which is not housed in the main hospital building and was considered to be a low-risk environment to staff and patients, has remained open since the onset of the outbreak and has continued to offer normal service. It offers specialist outpatient services to new and follow-up patients. The quotas of the clinics for appointments are usually filled months before the clinics are held, with the result that all clinics for the 10-week period since the outbreak were fully booked before the outbreak.

## DISCUSSION

The cause of SARS is a new coronavirus, distantly related to known coronaviruses.<sup>6,7</sup> The transmission of SARS usually occurs after close contact; by inhalation of small aerosolized droplets of nasal, oral, and tracheal se-

cretions; by inoculation of the upper aerodigestive tract following direct contact or contact with contaminated fomites (small bits of infected material on inanimate objects). SARS is a highly contagious and infectious disease with significant morbidity and mortality. Because otorhinolaryngology practice is closely involved with the mucus-producing cavities of the head and neck, it can be considered as a high-risk specialty.

All otorhinolaryngological wards, outpatient clinics, and operating theaters have been designated as high-risk areas because of the potential exposure to viral particles in nasal, pharyngeal, and tracheal secretions, saliva and sputum, blood, and cautery smoke. Entry of patients and escorts into an outpatient clinic or ward requires that they be screened at a triage desk (by staff wearing protective attire) for symptoms of a lower respiratory tract infection and/or a history of contact with persons believed to have had SARS. Each person's body temperature is measured.

Adequate and appropriate precautions are taken by staff to prevent themselves from becoming infected and transmitting the disease to colleagues and patients. These precautions, established by the Infection Control Committee of the hospital, require the health care worker to wear, after a ritual of hand-cleaning, cap, gown, overshoes, eye shield, N95 mask, and gloves. The changing of gloves and hand-washing between examinations of each patient are required. With health care workers in protective attire, patients are seen in the wards and clinics and operations are performed. On leaving a high-risk area, the protective apparel is removed and discarded in a specific order according to the Infection Control Committee guidelines.

Health care workers are at risk of getting infected whether or not they are in direct contact with patients with SARS. Every patient is a potential source of infection, so every patient should be treated as a suspect until proven otherwise. The danger lies in those patients with SARS who have few or no symptoms and who are not yet suspected of or identified as having SARS.

The attire worn by health care workers limits potential spread of infection from these patients. An added line of defense against exposure to patients with SARS occurs by screening patients at a triage desk at the entrance to the outpatient clinic. Although the staff working at the entrance desk are at high risk, they offer an added line of defense to second-line staff.

The outbreak of SARS has resulted in health care professionals and supporting staff working toward making its prevention, detection, and treatment a day-to-day priority. This has led to the modification of almost every aspect of patient care. Physicians wear protective attire in the outpatient clinic; the interview and examination are conducted by physicians behind eye shields and face masks with gloved hands. Entrance to each ward follows the strict routine of washing hands and donning a gown, cap, eye shields, N95 mask, and gloves. Patient notes and radiological images are geographically separated from the patient so that patient secretions which may contain virus particles cannot contaminate them. Writing instruments remain with the patient files. To limit the possibility of infection and the transmission of the virus, only personnel directly involved in the care of the patients conduct ward

rounds. Visitors are not allowed. The use of nebulizers and ultrasonic humidifiers has been discontinued.

In the 7 weeks following the outbreak, 27% of patients admitted with SARS were health care workers. The overall mortality from SARS during this period was 13%. The number of new cases of SARS is decreasing at the time of writing, and it is hoped that the provision of otorhinolaryngological services will gradually return to normal. In future planning of otorhinolaryngological services at the Prince of Wales Hospital, services will be designed specifically to minimize the risk of cross-infections within the hospital setting. This may involve reducing the number of patients in wards to prevent crowding and reducing the number of appointments in clinics. The current infection control measures in the hospital and the triage system for outpatients are likely to remain in place because they have been effective. Infection of health care workers by patients with SARS has been due to lapses in the use of personal protective equipment rather than to the equipment itself. Protected treatment areas in the otorhinolaryngological wards and for outpatients, such as dedicated nasopharyngoscopy rooms, are planned. Guidelines are being drawn up for the use of nebulizers and ultrasonic humidifiers in the wards and for high-risk otorhinolaryngological procedures such as rigid endoscopies and tracheostomies. There will be a growing emphasis placed on an otorhinolaryngological outpatient surgery service.

## CONCLUSION

The substantial impact of SARS on otorhinolaryngological services at the Prince of Wales Hospital has been multifaceted. The decrease in attendance at the outpatient clinic, which has remained open since the outbreak, has been due to patients defaulting on their appointments. Nonessential elective surgery has been suspended

until further notice, accounting for the decrease in surgical procedures performed and partially accounting for the decrease in bed occupancy in the wards. The temporary closure of the emergency department also contributed to the decrease in ward admissions and emergency surgery. The provision of otorhinolaryngological services has been restructured, and further restructuring is necessary to minimize the risk of cross-infections within the hospital setting. The changes will profoundly affect the day-to-day running of the outpatient clinic, wards, and operating theater. Although the changes are adequate, they may well prove to be permanent if the threat of SARS remains in the community. The present situation is having an impact on the quality of care available to patients with non-life-threatening otorhinolaryngological conditions.

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